RocketRAID 4320
SAS Host Adapter
User's Manual

HighPoint

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HighPoint Technologies, Inc.

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Chapter 1
Introduction

Contents of this Chapter:

About this guide
Introducing the RocketRAID 4320 Host Adapter
RocketRAID 4320 Features and Specifications
Understanding RAID Concepts and Terminology
Network Features (Web Management/BIOS Utilities)

About This Guide

The RocketRAID 4320 SATAII Host Adapter's User's Guide provides information about the functions and capabilities of the host adapter, and instructions for installing, configuring and maintaining RAID arrays hosted by the adapter.

The RocketRAID 4320 Host Adapter

The HighPoint RocketRAID 4320 is the world's fastest internal SAS RAID controller utilizing Intel IOP348 1.2GHz processor.

The RocketRAID 4320 is the latest product in storage technology, leveraging the storage performance in SAS and SATA II supporting the fastest available throughput while supporting enterprise level features such as Native Command Queuing (NCQ), staggered drive spin-up and SAF-TE (I2C) and SGPIO enclosure management support.

HighPoint RAID Management

HighPoint RAID Management software offers a user friendly interface to create, manage and maintain your storage solutions. Email notification and remote are some of the advance features that the RAID Management software has to offer.

Intel 81348 I/O Processor and SDRAM

The RocketRAID 4320 SAS RAID Controller has an integrated Intel I/O processor for hardware RAID parity calculations. With the new I/O processor the system CPU is free to perform other important tasks. There is 256MB of DDR SDRAM with ECC protection on the RocketRAID 4320 SAS RAID Controller for improved performance.

Comprehensive OS Support

HighPoint offers the broadest range of support for all major operating systems to ensure OS and hardware server compatibility. Drivers are available for all major operating systems, including Windows , Linux, Mac OS X and FreeBSD. GPL Licensed Linux drivers into main Linux kernel help customers easily install and configure the RocketRAID 4320.

Onboard Cache and Optional Battery Backup for optimal performance and added security

256MB of DDR Memory with ECC protection is integrated into the RocketRAID 4320 for improved performance, and provides additional security in the case of critical

system failure, when used in conjunction with the optional battery back up unit.

RocketRAID 4320 – Features and Specifications

Host Adapter Architecture

- TerabyteStream™ for Blazing Performance
- Intel IOP 81348(1.2GHz)
- PCI -Express x8
- 256 MB of DDR II memory with ECC protection
- 2 Internal MiniSAS Connectors (SFF-8087)
- Direct Connect up to 8 3Gb/s SAS/SATA Hard Drives
  Support up to 128 Hard Drives via SAS Expanders"
- 128 max hard drives via SAS expanders
- NVRAM for write journaling
- HPTBBU-03
- RoHS compliant

Advance RAID Features

- Support RAID 0, 1, 3, 5, 6,10, 50 and JBOD
- Multiple RAID support
- Multiple Logical Drive Support
- BIOS booting support
- BIOS PnP and BBS (BIOS boot specification)support
- Write through and write back cache
- Online array roaming
- Online capacity expansion (OCE) and Online RAID level migration (ORLM)
- Quick and Background initialization for instant RAID configuration
- Automatic drive insertion / removal detection and rebuild
- 64bit LBA support greater than 2TB per volume
- S.M.A.R.T(Early Warning System)
- Staggered Spinup with user selection in BIOS
- (MAID) spin down drives when array is idle
- SMTP for email notification

Array Monitors, Alerts and Indicators

- SMTP for email notification

- Alarm / Buzzer alerts for drive failure
- Hardware Monitor function
- Hard Drive LED indicators (Activity and Failed)
- SNMP for remote management
- Ethernet port for (OBM) Out of Bound Managment
- NTP (Network Time Protocol)
- Intelli-VRM. (Intelligent Virtual RAID Managment)

RAID Management

- TerabyteSaver™ and TerabyteGuard™ for Data Protection and Reliability
- API library for customizing AP
- Command Line Interface (CLI)
- Web browser-base RAID management software
- Disk scrubbing to prevent degraded RAID arrays
- Bad sector repair and re-mapping to reduce dropped drives
- SHI (Storage Health Inspector – Drive analysis from S.M.A.R.T)

Operating System Support

- Windows (2000, XP, x64, 2003/2008 Server, Vista (32 and 64)bit)
- Linux
- FreeBSD
- Mac OS X 10.4.x and above
- FreeBSD (1-6) binary support – Native support in 7.0
- GPL licensed driver into Linux Kernel 2.6.25

PHYSICALSPECIFICATIONS

Size: (167.0mm x 68.0mm) 6.75" L x 2.63" W

WEMI : FCC Part 15 Class B and CE

Thermal and Atmospheric Characteristics:

Work Temperature Range : +5℃ ~ + 55℃

Relative Humidity Range : 5% ~ 60% non condensing

Storage Temperature : -20℃ ~ +80℃

MTBF: 920,585 Hours

Electrical Characteristics:

PCI-e	3.3V	12V
Power	3W max	15W max

Understanding RAID Concepts and Terminology

The following concepts and terminology is commonly used when describing the functions of the RocketRAID 4320 Host Adapter.

Disk initialization

Initializing a disk writes necessary RAID configuration information to that disk. Disks must be initialized before configuring them into RAID arrays. The initialization process will destroy all data on the disk.

Disk Status

New The disk contains no data and has not been initialized.

Initialized The disk has been initialized and can be used for array creation.

Configured The disk has been assigned to one or more arrays, or configured as a spare disk.

Legacy The disk was used on other controllers before use with the RocketRAID 4320 (see *legacy disk* below).

Array initialization

A redundant array (RAID5, RAID1, RAID10) needs to be initialized to ensure full performance and reliability. Non-redundant arrays (RAID0, JBOD) do not need to be initialized.

When you create a redundant array using the RocketRAID 4320 controller's BIOS Configuration Utility, it will automatically start the initialization process. When creating an array using the HighPoint RAID Management Console software, you can specify an initialization option (Skip initialization, foreground and background).

Online Capacity Expansion (OCE)

This feature allows disks to be added to existing RAID arrays, in order to increase the array's capacity, without fear of data loss. Any number of disks can be added to an array, at any time. Data can be accessed and utilized even while being redistributed.

Online RAID Level Migration

This term describes the ability to change one type of array (RAID level), into a different type of array (changing a RAID 1 array into a RAID 10 array for example). Data is still

accessible during the migration process, and a base level of security is still active.

OCE, ORLM and the RocketRAID 4320

The RocketRAID 4320 supports both Online Capacity Expansion (OCE), and Online RAID Level Migration (ORLM). Both features are supported by a single function - an array can be transformed from one RAID level to another RAID level while simultaneously being resized, even under I/O load.

Spare disk

A spare disk is a single disk that can be used to automatically rebuild a redundant array in case of drive failure. Spare disks may also be members of a RAID array. Any available space on these disks may be used to rebuild other broken arrays.

Legacy disk

Disks attached to the RocketRAID 4320 that contain valid partition tables will be identified as legacy disks. A legacy disk attached to the RocketRAID 4320 can be accessed by the operating system, but cannot be used to create RAID arrays. A legacy disk must be initialized before assigning it to an array.

Monitor Features

Hardware Monitor function provides information of temperature,fan speed(I/O Processor),and voltages of the RAID controller.

Network Features

The RocketRAID 4320 offers a selection of network-oriented RAID Management functions. These features are integrated into the card's firmware, and can be administrated using the BIOS and Web-based management utilities.

SNMP Manager - Simple Network Management Protocol. Allows the administrator to view the current state of the entire RAID system.

SNMP Trap - The RAID adapter can be configured to report events over the network. When an event is generated by the RAID Management utility, the SNMP Trap will send SNMP Trap messages to the Trap Receiver.

NTP - Network time protocol. The RocketRAID 4320's firmware automatically synchronizes it's internal clock to match that of the selected server. If a NTP server is not specified, the adapter will synchronize itself with the host system's BIOS clock.

Chapter 2
RocketRAID 4320
Hardware Description/Installation

Contents of this Chapter:

RocketRAID 4320 Hardware

1 - RocketRAID 4320 Adapter Layout

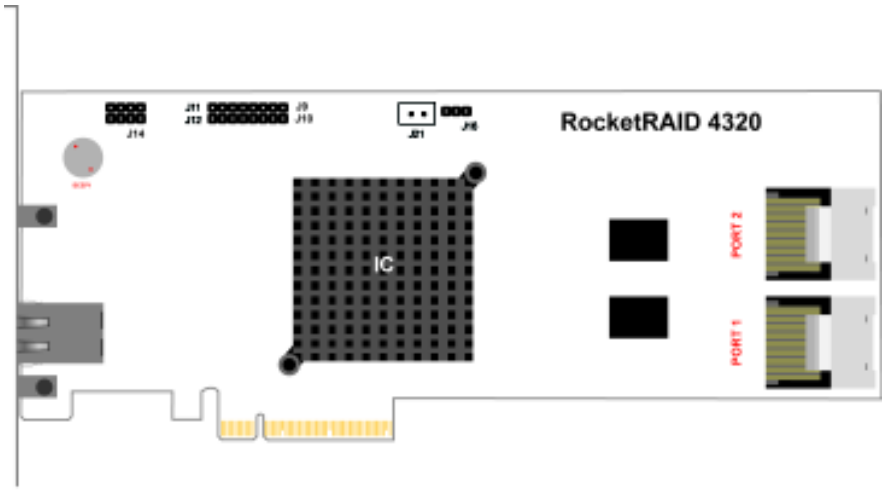
2 - Installing the RocketRAID 4320 Host Adapter

3 - Verifying Installation

4 - Battery Backup

RocketRAID 4320 Hardware

1 - RocketRAID 4320 Adapter Layout

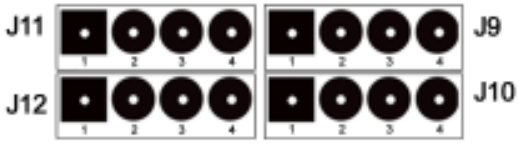


Port1, Port2

These represent the RocketRAID 4320's 2 Internal Mini-SAS ports. Each port can support up to 4 SAS/SATA hard disks.

J9,J10,J11,J12

J9,J10 are Disk Activity leds; J11,J12 are Disk Failure leds.

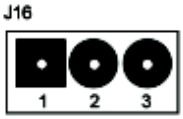


Pin Connections represent SAS/SATA channel/port antitheses table.

PIN Number / Connections	PIN1	PIN2	PIN3	PIN4
J9	Drive1	Drive2	Drive3	Drive4
J10	Drive5	Drive6	Drive7	Drive8
J11	Drive1	Drive2	Drive3	Drive4
J12	Drive5	Drive6	Drive7	Drive8

J16

This connertor supports SAF-TE interface(I2C).



Pins defined as follow:
Pin 1: SCL; Pin 2: GND ; Pin 3: SDA.

J14 (BBU connector)

Connector for HPTBBU-03. (optional part).

BEEP1 – Speaker

Alarm (speaker): the speaker emits and audible alarm in the case of disk/array failure.

Ethernet Port

Ethernet port for Out of Bound Management, support Net Time Protocol.

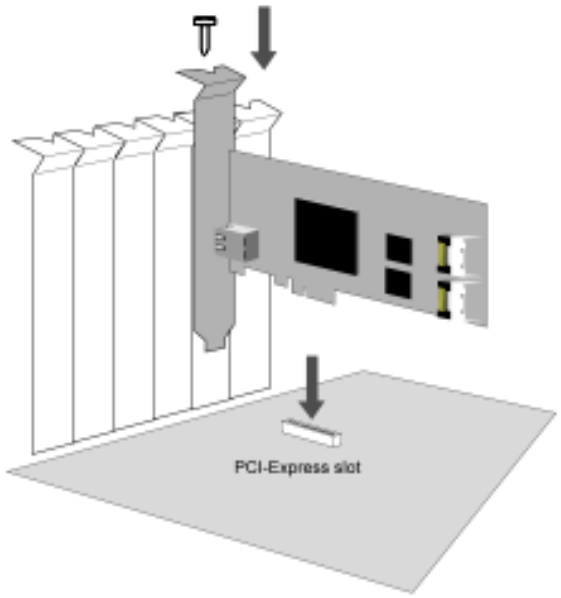
Cable – Internal Mini-SAS to Mini-SAS

The integrated RocketRAID 4320 include 2 Internal Mini-SAS to Mini-SAS cables, each of the cable can support 4 SAS hard disks.

2 - Installing the RocketRAID 4320 Host Adapter

Note: Make sure the system is powered-off before installing the RocketRAID 4320 host adapter.

1. Open the system chassis and locate an unused PCI-E x8 or x16 slot.
2. Remove the PCI slot cover.
3. Gently insert the RocketRAID 4320 into the PCI-E slot, and secure the bracket to the system chassis.
4. After installing the adapter, attach the Mini-SAS connectors to the RocketRAID 4320's Mini-SAS port,and to chassis backplane. Each Mini-SAS cable supports up to 4 hard disk drives. Consult the chassis's manual for proper installation procedures.
5. Close and secure the system chassis.



3 - Verifying Installation

Once the RocketRAID 4320 host adapter and hard disks have been installed into the chassis, boot-up the system to verify that the hardware is properly recognized.

1. Power on the system. If the system detects the presence of the adapter, the RocketRAID 4320 BIOS Utility will be displayed during bootup.
2. Press Ctrl+H to access the RocketRAID 4320 BIOS Utility.

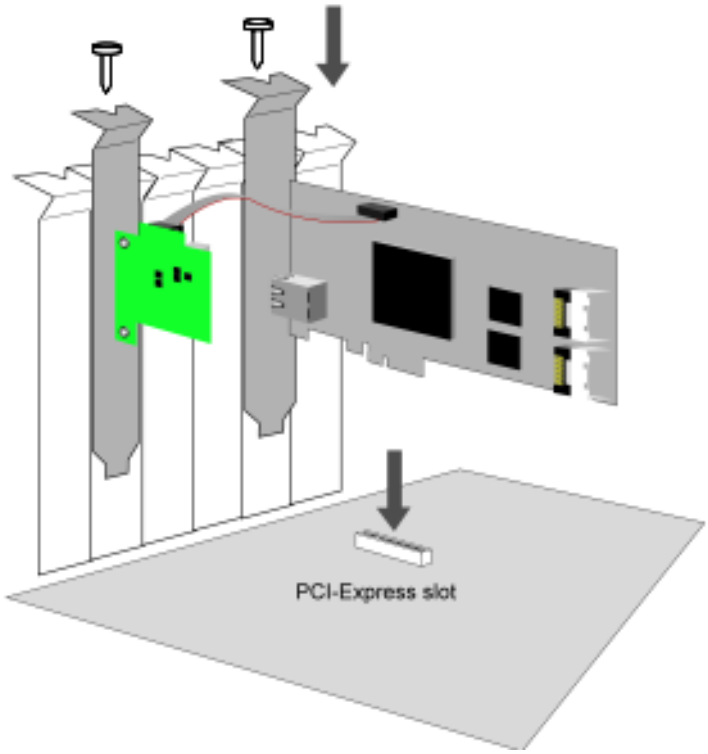
The BIOS Utility will display information about hard disks attached to the adapter. Make sure all attached disks are detected by this utility. If any of the hard disks are not detected, power down the system and check the cable connections to both the card, and enclosure.

4 - Battery Backup

A battery backup option will be available as an optional add-on component.
The battery provides additional data security in case of a critical system failure.

Data normally lost during a major system fault, such as a power outage or CPU failure, which was in transit at the time of the failure (stored in the card's onboard cache), will remain viable for up to 72 hours.

The battery unit can be attached to the card using the BBU CONN.
Attach the BBU into J14 of RocketRAID 4320 using the cable included with the BBU unit:



Chapter 3
RocketRAID 4320 BIOS Utility

Contents of this Chapter:

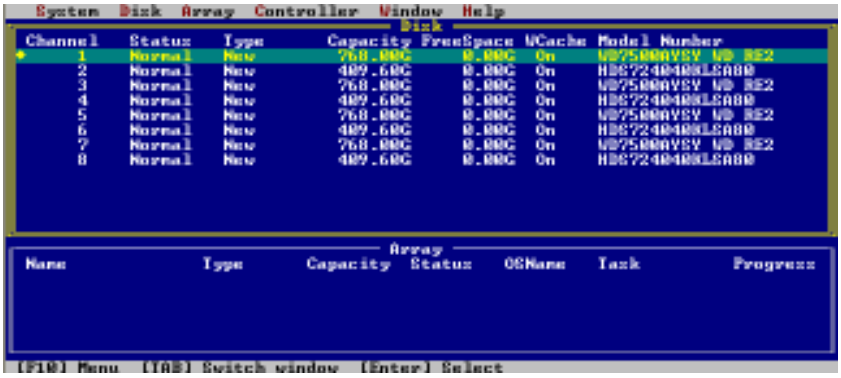
RocketRAID 4320 BIOS Utility
1 - BIOS Command Overview
2 - Disk Menu
3 - Array Menu
4 - Controller Menu

RocketRAID 4320 BIOS Utility

The RocketRAID 4320's BIOS Utility can be accessed using the "Ctrl+H" command. This command should be displayed automatically when the RocketRAID 4320's BIOS screen appears during the system's boot up procedure.

1 - BIOS Command Overview

The RocketRAID 4320 BIOS Utility provides a wide selection of RAID related commands. These commands are displayed towards the top of the utility's interface.


System Disk Array Controller Window Help
Disk
Channel Status Type Capacity FreeSpace WCache Model Number
1 Normal New 760.00G 0.00G On WD7500AYSY WD RE2
2 Normal New 409.60G 0.00G On HDS724040KLSA80
3 Normal New 760.00G 0.00G On WD7500AYSY WD RE2
4 Normal New 409.60G 0.00G On HDS724040KLSA80
5 Normal New 760.00G 0.00G On WD7500AYSY WD RE2
6 Normal New 409.60G 0.00G On HDS724040KLSA80
7 Normal New 760.00G 0.00G On WD7500AYSY WD RE2
8 Normal New 409.60G 0.00G On HDS724040KLSA80
Array
Name Type Capacity Status OSName Task Progress
[F10] Menu [TAB] Switch window [Enter] Select

General Navigation

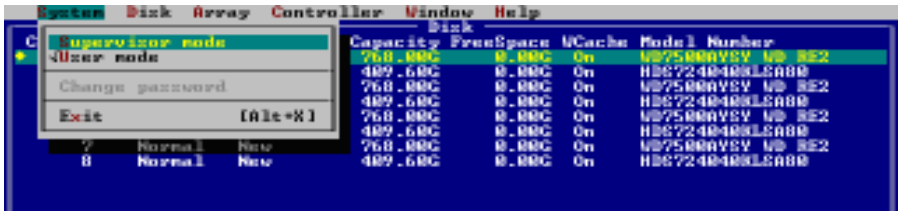
Press ALT + the first letter of the each menu item (highlighted in red) to access the corresponding menu (Alt + D will open the "Disk" menu bar). You can also press F10 to quickly browse through the various menu selections. Use the ← → arrow keys to select the desired item, and press ENTER to open the menu. Use the ↑ ↓ arrows keys to select the desired command from each menu, and press the ENTER key to confirm the selected command.

There are two windows in the utility's interface; Disk interface and Array interface. Use the TAB key to switch between each interface.

Supervisor/User mode

The default BIOS operation mode is **User mode**; user can only view some information of the controller through BIOS. If user wants to modify the setting of the RAID controller, it must be changed to **Supervisor mode**:

Press [ALT + S] to open the “System” menu in the figure 1; then select “Supervisor mode”, and press ENTER. This will open the user authentication interface. Enter the appropriate password and then press ENTER. The initial password is “hpt”.

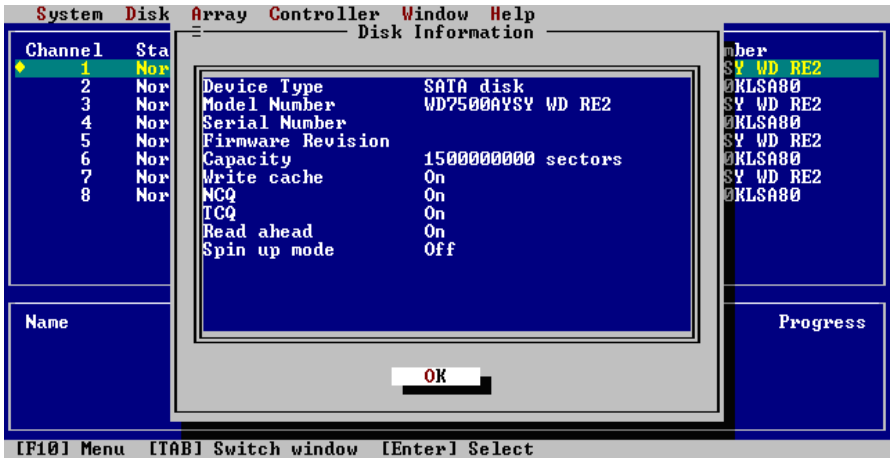


2 - Disk Menu

Press [ALT + D] to access the “Disk” menu.

View a disk

From the Disk menu, use the ↑ ↓ arrows keys to select a disk. After highlighting the desired disk, select Disk->Information to view hardware data about this disk.



Disk initialization

Disks must be initialized prior to creating a RAID array. To initialize a disk, access the Disk menu and highlight a disk using the ↑ ↓ arrows keys. Press ENTER to add the disk to the initialization list. Repeat this procedure for each disk that requires initialization. After selecting the required disks, select Disk->Initialize option from the Disk menu.

Note: If the selected disk has already been initialized, the BIOS utility will display a warning message, but will continue to initialize the remaining disks.

Warning: Initializing a disk may result in data loss – do not initialize disks that contain critical data. Non-initialized disks can still be utilized as stand-alone drives, and will be recognized as "Legacy" devices.

Other Disk related Functions

"Disk->**Toggle Spare**", "Disk->**Unplug**", "Disk->**Rescan**", "Disk->T**urn on write cache**", and "Disk->**Turn off write cache**" work in the same manner as Disk Initialization. Highlight the desired disks and press ENTER to select them. Return to the Disk menu, highlight the desired function, and press ENTER to initiate the task.

Toggle Spare – use this option to specify spare disks. Spare disks are used to automatically rebuild failed RAID arrays.

Unplug – use this option to safely remove the selected hard disk. This allows you to safely park and power off a disk while the system remains active.

Rescan – use this option when attaching hard disks to the RocketRAID card.

Turn on/Turn off write Cache – use these options to enable or disable write cache on the selected disks. Disk cache is enabled by default.

3 - Array Menu

Press [ALT + A] to access the "Array" menu.

Create an Array

To create a RAID array, first access the Disk menu. Use the ↑ ↓ arrows keys to highlight a disk, and press the Enter key to confirm the selection. Repeat this procedure to add additional disks to the array. Once the appropriate disks have been selected, return to the Array menu, highlight the Create option, and press ENTER to access the "Create Array" page. Use the TAB and [Shift + TAB] to select from the corresponding RAID settings (Radio button, Edit box, etc.), and use the SPACE key to confirm the selections.

VSS (Variable Sector Size):

If the array's capacity is over 2TB, user will be asked to select the **Sector Size** values (from 512B to 4K)**:**

Note: Variable Sector Size (VSS) for over 2TB support in 32bit LBA OS.
It changes the sector size from default 512 Bytes to 4k Bytes etc. the maximum volume capacity up to 16TB. This option works under Windows platform only. And it CANNOT be converted to Dynamic Disk, because 4k sector size is not a standard format.

View an Array

To view information about a specific Raid array, use the TAB key to switch to the Array Interface view, and use the ↑↓ arrows keys to select the array. After selecting the array, access the Array menu and select the Information option, then press ENTER.

Other RAID array related functions

"Array->**Delete**", "Array->**Unplug**", "Array->**Verify**", "Array->**Start task**", "Array->**Stop task**" and "Array->**Set Boot"** work in the same manner as the "View an Array" function.. Highlight the desired array using the Array Interface view, and press ENTER.. Return to the Array menu, select the desired function, and press ENTER to initiate the task.

Delete – use this option to delete the selected array.

Warning: all data on the selected array will be lost

Unplug – use this option to safely remove each disk member of the selected array. This allows you to safely park and power off each hard disk while the system remains active.

Verify – select this option to verify the integrity of the selected array. Routine RAID verification is essential to avoid data loss in the case of disk failure.

Start Task – select this option to schedule specific RAID maintenance tasks such as RAID Verification.

Stop Task – use this option to terminate scheduled tasks.

Set boot - use this option to set an array to act as a boot volume.

Note: This setting is dependent on the motherboard's BIOS configuration. An array designated as a boot volume cannot be used to boot the system unless the card has been instructed to act as the system's boot device. Consult the motherboard's BIOS/ CMOS setup menu, and corresponding manual for more information.

4 - Controller Menu

Press [ALT + C] to access the "Controller" menu.

View Controller information

To view information about the controller, access the Controller menu, select "view" and press ENTER. It can also view the controller's basic information, include Firmware Version,CPU Temperature and so on.

View Events

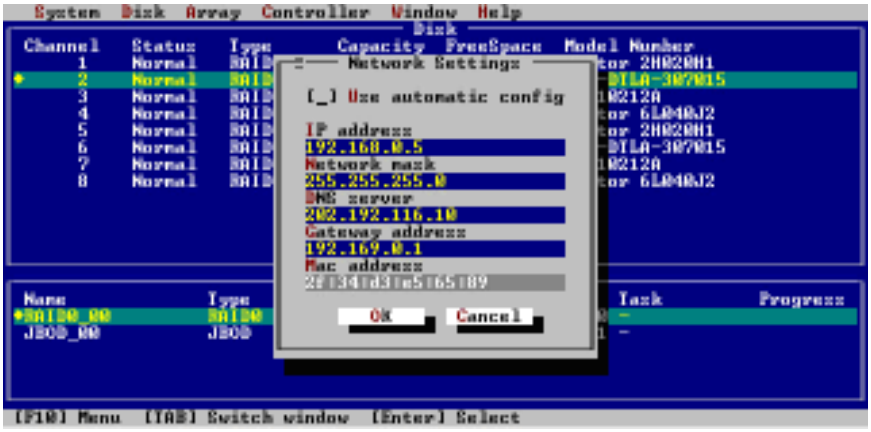
To view the RocketRAID event log, access the Controller menu, select "Evnetlog" and press ENTER. Use [Shift + TAB] to select from the different items (check boxes, editable fields), and use the SPACE key to confirm the selection. There are three selectable filter options, which can be used specify the type of information presented by the selected log. A maximum of 10 logs are listed in the utility at a time; use the "Prev" and "Next" button to turn the pages. Use the "Clear" button to delete all logs.

Controller Setting

To access the Controller Settings page access the Controller menu, select "Settings" and press ENTER. Use [Shift + TAB] to select between different menu items Radio buttons, check boxes, editable fields, etc., and use the SPACE key to confirm the selection.

Network Setting

Use this menu to configure the RocketRAID card's network settings. Access the Controller menu, select "Network" and press ENTER. You can select "Use automatic config" to request the network information from the system, or configure the settings manually.



Chapter 4
RocketRAID 4320 Driver and Software Installation Microsoft Windows (2000, XP, 2003 Server, Vista)

Contents of this Chapter:

Driver and Software CD

Windows Driver Installation

HighPoint

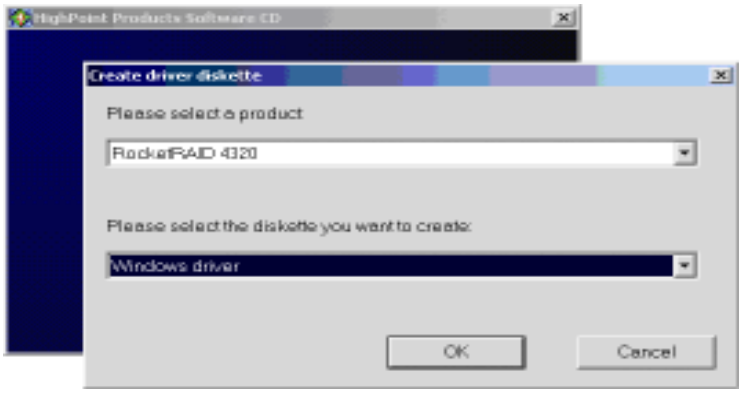
Driver and Software CD

The RocketRAID 4320 retail box includes a Driver and Software CD.
This CD can be used to generate driver diskettes, and install the RAID Management software for a variety of operating systems.

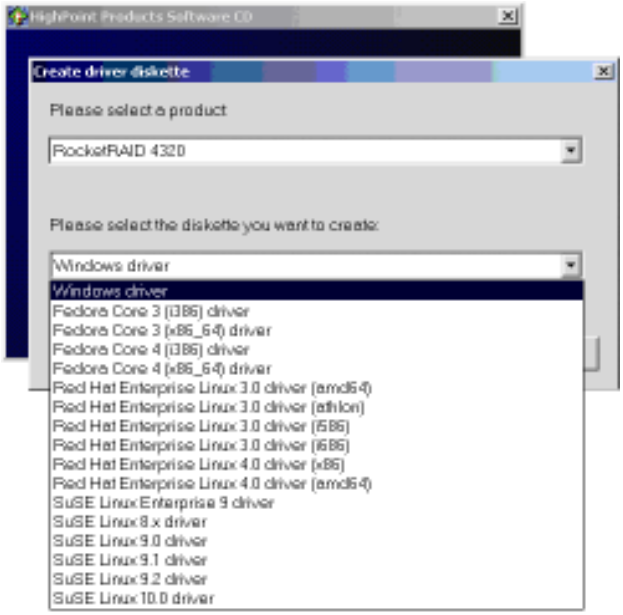
To create a driver diskette:

1. Insert the CD into the system's CD/DVD drive. The program should start automatically.
2. Insert a blank floppy diskette into the system's floppy drive.
3. Click on "Create Driver Diskette".

4. Click on the "Please Select a Product" drop-down button, and select "RocketRAID 4320" from the list.



5. Click on the “Please Select the Diskette you want to create” drop-down button, and select the appropriate OS from the list.


HighPoint Products Software CD
Create driver diskette
Please select a product
RocketRAID 4320
Please select the diskette you want to create:
Windows driver
Windows driver
Fedora Core 3 (i386) driver
Fedora Core 3 (x86_64) driver
Fedora Core 4 (i386) driver
Fedora Core 4 (x86_64) driver
Red Hat Enterprise Linux 3.0 driver (amd64)
Red Hat Enterprise Linux 3.0 driver (athlon)
Red Hat Enterprise Linux 3.0 driver (i586)
Red Hat Enterprise Linux 3.0 driver (i686)
Red Hat Enterprise Linux 4.0 driver (x86)
Red Hat Enterprise Linux 4.0 driver (amd64)
SuSE Linux Enterprise 9 driver
SuSE Linux 8.x driver
SuSE Linux 9.0 driver
SuSE Linux 9.1 driver
SuSE Linux 9.2 driver
SuSE Linux 10.0 driver

6. Click on the “OK” button to create the driver diskette.

To install the RAID software:

1. Click on “Install RAID Management Software”.

2. Select the desired software from the drop down menu, and click on the “OK” button.

Windows Driver Installation

Before installing the RocketRAID 4320 device driver, make sure the RocketRAID 4320 host adapter and all required hard disks have been installed into the system's chassis (refer to the Hardware Installation section, pages 2-2, 2-3).

Installing the RocketRAID 4320 driver for an existing Windows XP/2003/x64 system

After the operating system has booted, Windows will automatically detect the RocketRAID 4320, and request that a device driver be installed. To install the device driver, follow the steps outlined below:

1. When the "Found New Hardware Wizard" window appears, select "Install from a list or specific location (Advanced)", and click Next to continue.
2. Click on the "Include this location in the search" option, and select the system's floppy drive (generally Disk A). Next, insert the Driver Installation diskette into the system's floppy drive.
3. At the Hardware Wizard screen, select the floppy drive as the source, then click the Next button. Select the appropriate operating system folder, then, click the Next button.
4. Windows will display a warning message that states the driver has "not been signed". Select "Continue Anyway", then, click Finish when prompted. When Windows asks to reboot the system, choose No.
5. Windows will then display a second "Found New Hardware Wizard" window – repeat steps 1 through 4.
6. Remove the Driver Installation diskette from the floppy drive, then Shut down and restart the computer.

Installation Verification

After the driver has been installed, and the system has been restarted:

1. Click the Start button, then right-click My Computer icon. Select the Properties item from the popup menu.
2. In the popup window, select Hardware tab and then click Device Manager button.
3. Double click the "SCSI and RAID controllers" entry. If the RocketRAID 4320 device entry is not displayed, or there are "?" or "!" marks displayed near the RocketRAID 4320 entry, the driver has not been installed properly. Delete the entries and reinstall the driver.

Installing the RocketRAID 4320 driver during a fresh Windows 2000/XP/2003/x64 installation

1. After booting from the Windows 2000/XP/2003 CD-ROM, when the Windows Setup blue screen appears, look towards the bottom of the screen. Windows will prompt you to press the F6 key if you want to install a third party SCSI or RAID driver. Press the F6 key at this time.
2. The setup procedure will continue, and will later instruct you to press the "S" key to specify additional adapters. Press the "S" key as instructed.
3. Next, the setup program will prompt for the insertion of the driver diskette. Please insert the driver diskette, and then press ENTER to continue.
4. The next window will display several driver options. Please select the RocketRAID 4320 Controller for the corresponding operating system, and press ENTER to continue.

Windows Vista Driver Installation

Installing the driver during a fresh Windows Vista installation

1. Boot from Windows Vista DVD.
2. When the screen "where do you want to install Windows" appears, click "Load driver" and browse for the driver location. Windows Vista can install drivers from several media types: floppy diskette, USB flash disk or CD.
3. Select the RocketRAID 4320 controller driver, and click "Next".
4. The driver is now installed - you can now continue on with the installation procedure.

Installing the driver for an existing Windows Vista system

1. Install the RocketRAID 4320 host adapter into the PC, then boot up Windows Vista.
2. Windows should automatically detect the card, and display the "Found New Hardware" wizard pop-up window. Select "Locate and install driver software". When Windows asks: "Windows needs your permission to continue", select "continue".
3. Select "I don't have disc, show me other options" and then select "Browse my computer for driver software".
4. Specify the location of the driver and click "Next".

5. When asked: “Would you like to install this driver software?”, select “Install”.
6. Reboot the system when prompted. The RocketRAID 4320 will be available for use after Vista reboots.

Installation Verification

After the driver has been installed, and the system has been restarted:

1. Click the Start button, then right-click My Computer icon. Select the Properties item from the popup menu.
2. In the popup window, select Hardware tab and then click Device Manager button.
3. Double click the “SCSI and RAID controllers” entry. If the RocketRAID device entry is not displayed, or there are “?” or “!” marks displayed near the RocketRAID entry, the driver has not been installed properly. Delete the entries and reinstall the driver.

Chapter 5
RocketRAID 4320
Web RAID Management Interface

Contents of this Chapter:

1 - Web RAID Management Interface

2 - Preparing Hard disks

3 - Array Management

4 - Device Management

5 - Configuring Spare Disks

6 - Managing Events and Tasks

7 - Settings

1 - Web RAID Management Interface

There are two methods to access the RocketRAID 4320's web-based RAID management interface: Use HighPoint In-band Management Service or use the adapter's Ethernet port (out-of-band management).

The Web RAID Management interface is a firmware-based utility. If you are using the adapter's Ethernet port, you need no additional software and configuration on the host system. You can access the web interface once you have setup the adapter's network configuration.

You can also access the web interface through the in-band management software. The in-band management software acts as a proxy between the web browser and the firmware. The in-band management software can also provide remote RAID management through the host system's network interface.

Installing the HighPoint In-band Management software.

For Windows:

Run setup.exe from the in-band management software folder on the software CD.

For Linux:

The in-band management software is distributed as a RPM package. You can install it by "rpm –i" command.

For FreeBSD:

You can install the in-band management software by "pkg_add" command.

For more information about in-band management software, please check the README file in the in-band management software package.

Starting the Management Interface

Note: *To use the web-based RAID management interface, a web browser with XML support is required, e.g. Internet Explorer 6.0+, Mozilla, FireFox, or Safari (for OSX systems).*

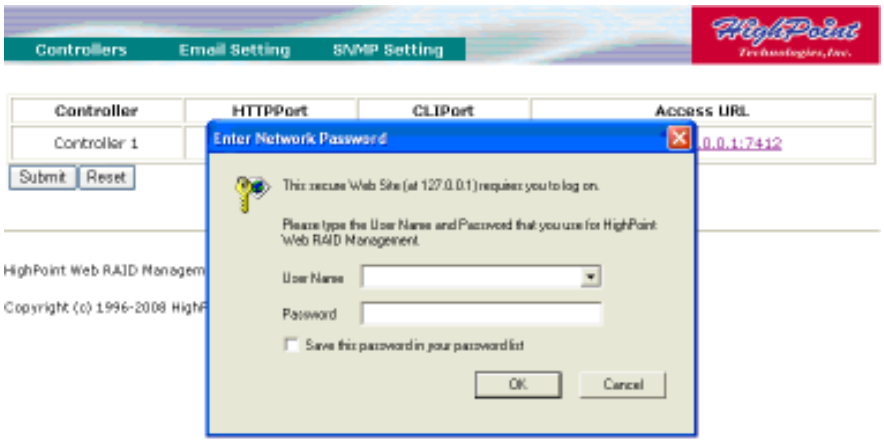
To run the management interface, start the web browser and enter the access URL.

If you are using the adapter's Ethernet port, please enter http://adapter-ip-address

If you are using in-band management software, please enter http://host-address:7402

Where host-address is the host name or IP address of the host system. Specifically, if you are running the browser on the host system, you can use http://localhost:7402.

The in-band management software provides an access URL for each controller on the system. You can access the RAID management interface for each controller through its access URL.



Then Select the controller's Access URL by click the link http://127.0.0.1:7412
You will be asked for the User and Password to login. The default user name is "RAID" and the initial password is "hpt". You can change the password after you have logged in.

2 - Preparing Hard disks

Disks must be initialized before they can be configured into RAID arrays.

Normally, disks only have to be initialized once. The disk initialize process should only take a few seconds.

Initializing disks may result in loss – do not initialize disks unless they are to be configured into RAID arrays.

Initializing hard disks:

1) *Select the "Manage - Device" function to access the device management page.*
2) *Click on the "Initialize Devices" button towards the upper portion of the interface screen.*

3) Checkmark each disk you wish to initialize, and click the Submit button.

Warning: *initializing disks may delete data stored on the selected disks.*

Legacy Disks

Disks that already contain data or have been partitioned will be recognized as "Legacy Disks".

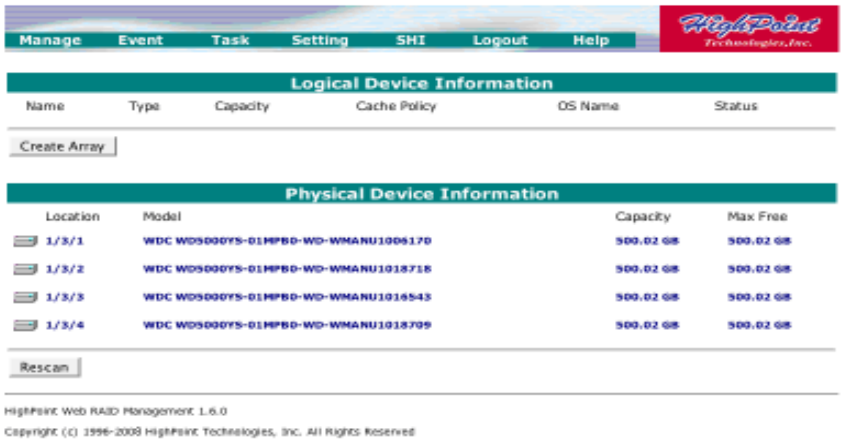
Arrays cannot be created from Legacy Disks. These disks would have to be initialized, which may result in data loss.

3 Array Management

Creating an Array

To create an array:

1. Select "Manage - Array" from the menu.
2. Click the Create Array button. The create array page will appear.



3. Choose the array type you want to create from the drop-down list.
4. Enter a name for the array (this is optional)

5. If you are creating a redundant RAID array (RAID1, 5, 6, 10, 50), select an initialization option for the array.

Note: *An un-initialized RAID1 or RAID10 array can still provide redundancy in case of a disk failure. A RAID5 array, however, is not fault-tolerant until initialization is finished.*

6. Specify a cache policy:

   Write-back

   When the write-back setting is selected, writes to the array are cached. This will result in higher performance, but data loss may occur in case of a power failure.

   Write-through

   When the write-through setting is selected, writes to the array are always passed directly to the disks. Subsequent reads may still be completed from the cache, if appropriate.

   None

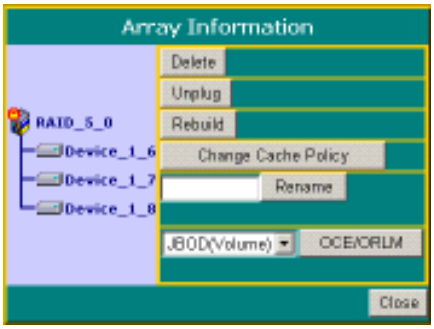
   Neither write-back nor write-through cache is used. I/O data will be passed to disks directly.

7. Select disks from the Available Disks list.
8. Enter a capacity for the array, or use the default value (the maximum capacity for the array).
9. Click Create. If you have specified an initialization option, the initialization process will start automatically.

Deleting an Array

To delete an array:

1) Select "Manage - Array" from the menu.
2) Click on the Maintenance button. An Array Information window will appear.



3) Click the Delete button.

Note: *An array in use by the operating system cannot be deleted. Any data stored on a deleted array will be inaccessible*

Array Maintenance – Rebuilding/Verifying/Modifying RAID arrays

Rebuilding a Failed Array

When an array member in a redundant array fails, the array will be listed as broken. A broken array will be automatically rebuilt using available-spare disks. However, if you have no spare disks configured, you can still rebuild by manually adding an Available Disk to the array. To add a disk to a broken array:

1) Select menu "Manage - Array".
2) Highlight the desired RAID array
3) Click the "Maintenance" button.
4) Click the "Add Disk" button.
5) If the disk is successfully added to the array, rebuild process will start automatically. A progress bar will be displayed.

Note: If the system utilizes hot-swap capable enclosures, you can add new physical disks to the RocketRAID card in order to rebuild or modify an existing array, using the "Rescan" feature.

Reminder: When adding disks manually, make sure to initialize the disk (see Preparing Hard Disks).

Only initialized disks can be used to rebuild RAID arrays.

Verifying an Array

For a RAID 1 or RAID1/0 array, verify process compares the data of one mirror pair with the other. For RAID 3, 5 and RAID 6, verify process calculates RAID parity and compares it to the parity data on the array. Verification checks each sector on a drive. Periodic verification of an array allows the disk drive firmware to take corrective actions on problem areas on the disk, minimizing the occurrence of uncorrectable read and write errors.

To verify an array:

1) Select menu "Manage - Array".

2) Highlight the desired RAID array
3) Click the "Maintenance" button.

Click the Verify button to start the verify process.

OCE/ORLM – modifying existing RAID arrays

Expanding/Migrating an Array

With the OCE/ORLM function, you can migrate an array from one RAID level to another RAID level and/or expand the array dynamically, even under I/O load. This function implements both Online Capacity Expansion (OCE) and Online RAID Level Migration (ORLM).

To expand/migrate an array:

1) Select "Manage - Array" from the menu.
2) Highlight the desired RAID array
3) Click the "Maintenance" button.
4) Select the target array type.
5) Click the "OCE/ORLM" button.
6) The OCE/ORLM page will appear. The interface is similar to the array creation wizard:

Note:

A) When expanding a JBOD array, all the original disks must be included in the target array, and these disks must be selected in the same order (as the original array). If you want to migrate a JBOD array to another RAID level, only the first member disk can be included in the target array. For example, a JBOD comprised of 3 disks (1, 2, 3), can only be "migrated" using disk 1. Disks 2 and 3 cannot be used – disk 1 would have to be combined with other disks attached to the RocketRAID card.

B) You cannot change an array to another type of array with a smaller capacity. In some cases, a disk may need to be added to the RocketRAID card.

During the OCE/ORLM procedure, the redundancy level of the array will be the lowest of the source and target arrays; e.g. if you ORLM a RAID0 array to a RAID1 array, the array will be non-redundant until the procedure is complete.

C) The OCE/ORLM process can be aborted and continued at later time. However, you should always stop the transform progress from the RAID Management software.

An unexpected system crash may result in data loss while performing OCE/ORLM on an array. We strongly recommend backing up data before starting the OCE/ORLM process.

After the OCE/ORLM procedure has completed, reboot the system.

Other RAID related Functions

Renaming an Array

You are free to rename RAID arrays. This will not harm the array – data will not be lost.

To rename an array:

1) Select "Manage - Array" from the menu.
2) Highlight the desired RAID array
3) Click on the "Maintenance" button.
4) Enter a new name for the array in the provided field.
5) Click the "Rename" button.

Note: *An array running background tasks cannot be renamed.*

Unplug

This can be used to safely take an entire array offline while the system remains operational.

To Unplug an array:

1) Select "Manage - Array" from the menu.
2) Highlight the desired RAID array
3) Click on the "Maintenance" button.
4) Click the "Unplug" button.
5) The software will notify you when it is safe to remove the array.

Note: *Make sure the array is not in use before using this command. Active arrays cannot be unplugged.*

4 Device Management

Select the "Manage - Device" function to access the device management page.

Change Device Settings

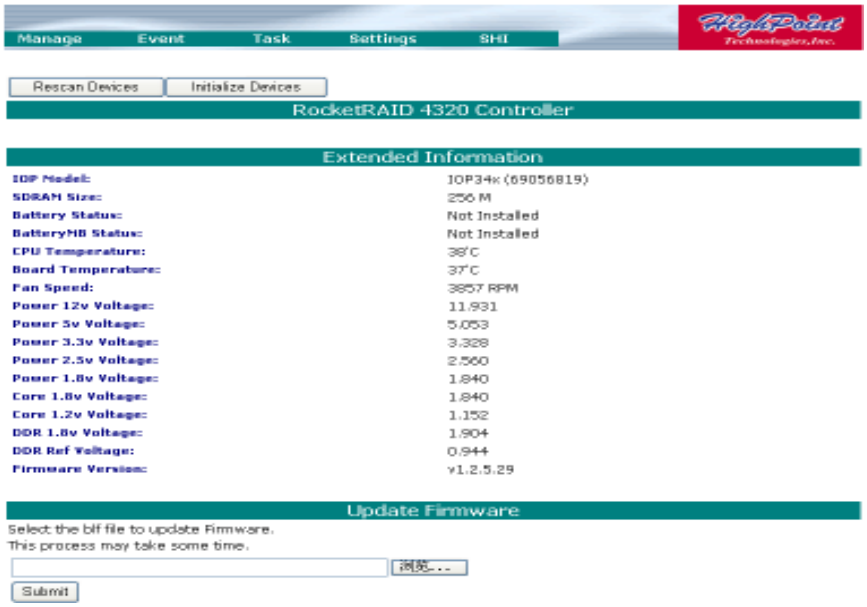
Depending upon the capabilities RAID controller and hard disks drives in use, several configurable device settings may be available: Read Ahead, Write Cache, TCQ, and NCQ. Each feature can be enabled or disabled individually, for each hard disk.

Unplug

The Unplug option found below each Device name, can be used to quickly remove (hot-swap) a Legacy disk.

Extended Information & Update Firmware

The device management page also show the extended information of the RAID controller, such as onboard memory and battery information.



User can also use the Web RAID management to upgrade controller's firmware.

SHI – Storage Health Inspector

The primary SHI interface displays a brief "health" summary of each hard disk.

Controller ID

Which controller /card the disk is attached to.

Port #

Port location of the hard disk

Device SSN#

Serial number of the hard disk

RAID

RAID/Non-RAID status

F

Temperature (in Fahrenheit) of the hard disk (Celsius is displayed under the SMART status)

Bad Sectors/Found & Repaired

The card is capable of repairing bad sectors – a summary of this activity is presented here.

Device Status

OK means the disk is in a healthy state. A Failed status suggests the disk was taken offline (due to a RAID, SMART or sector failure).

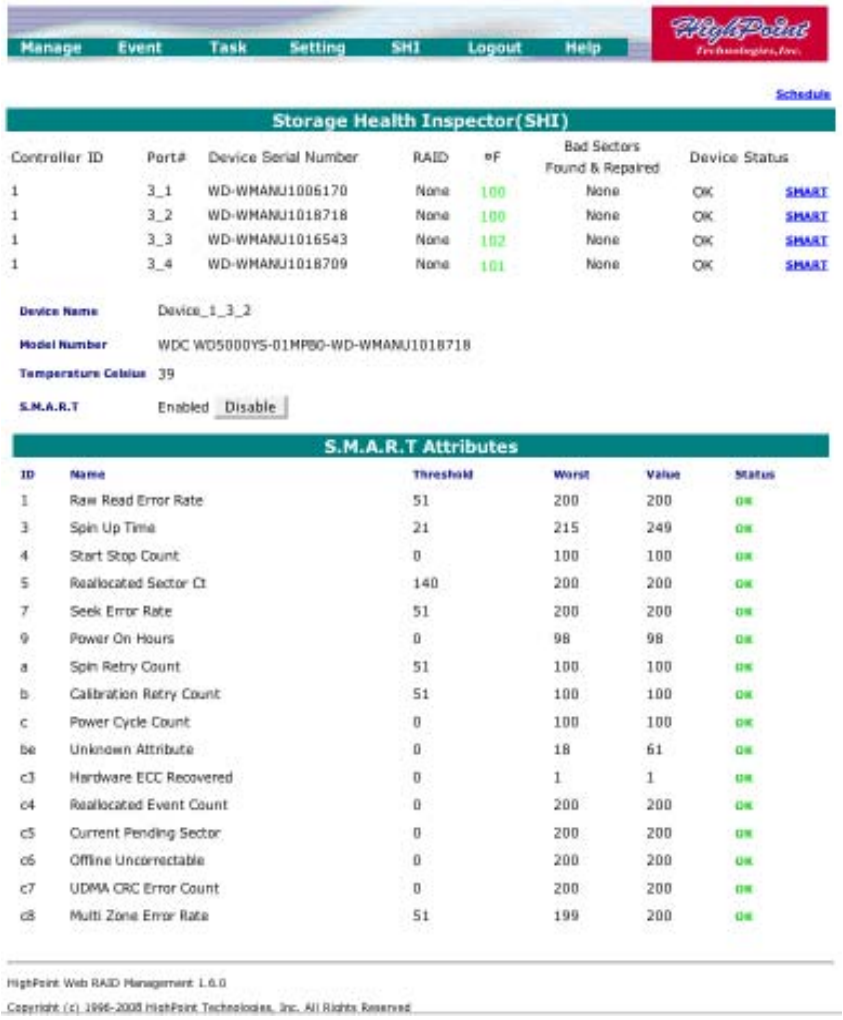
Schedule

Click on the blue "Schedule" link to access the Event menu.

S.M.A.R.T Status

You can view S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) data about a particular hard disk to help troubleshoot problems that occur. You can also setup periodically S.M.A.R.T. status checking to send notification messages when S.M.A.R.T. thresholds are exceeded.

Click on the blue "SMART" text to view the SMART status of the hard disk.


Manage
Event
Task
Setting
SHI
Logout
Help
Schedule
Storage Health Inspector(SHI)
Controller ID
Port#
Device Serial Number
RAID
°F
Bad Sectors Found & Repaired
Device Status
1 3_1 WD-WMANU1006170 None 100 None OK SMART
1 3_2 WD-WMANU1018718 None 100 None OK SMART
1 3_3 WD-WMANU1016543 None 102 None OK SMART
1 3_4 WD-WMANU1018709 None 101 None OK SMART
Device Name Device_1_3_2
Model Number WDC WD5000YS-01MPB0-WD-WMANU1018718
Temperature Celsius 39
S.M.A.R.T Enabled Disable
S.M.A.R.T Attributes
ID Name Threshold Worst Value Status
1 Raw Read Error Rate 51 200 200 OK
3 Spin Up Time 21 215 249 OK
4 Start Stop Count 0 100 100 OK
5 Reallocated Sector Ct 140 200 200 OK
7 Seek Error Rate 51 200 200 OK
9 Power On Hours 0 98 98 OK
a Spin Retry Count 51 100 100 OK
b Calibration Retry Count 51 100 100 OK
c Power Cycle Count 0 100 100 OK
be Unknown Attribute 0 18 61 OK
c3 Hardware ECC Recovered 0 1 1 OK
c4 Reallocated Event Count 0 200 200 OK
c5 Current Pending Sector 0 200 200 OK
c6 Offline Uncorrectable 0 200 200 OK
c7 UDMA CRC Error Count 0 200 200 OK
c8 Multi Zone Error Rate 51 199 200 OK
HighPoint Web RAID Management 1.6.0
Copyright (c) 1996-2008 HighPoint Technologies, Inc. All Rights Reserved

Note: *S.M.A.R.T attribute data is drive-specific. The software includes a list of definitions for popular drive models/manufacturers. Unknown S.M.A.R.T. attributes will be shown as "unknown". You can add the attribute definitions for your drive in the file smart.def (which resides in the software installation directory).*

Rescan Devices

When you physically add drives to the controller while the system is running, you can rescan the controller to reflect the change.

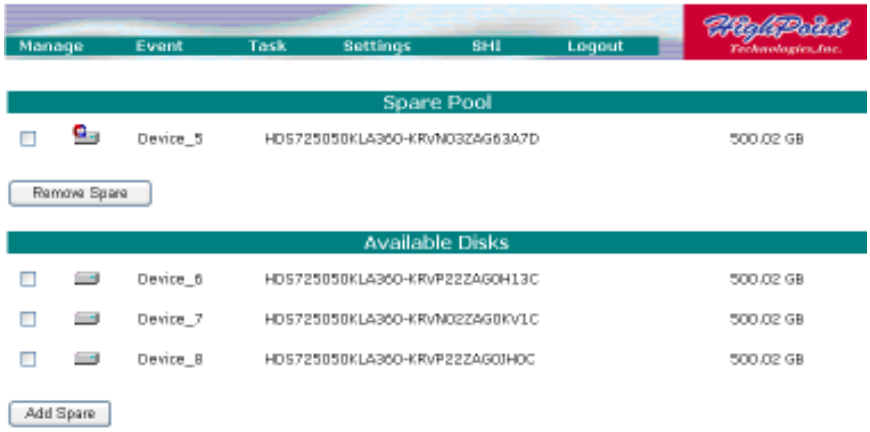
To rescan the devices:

1) Select menu "Manage - Device".
2) Click "Rescan Devices" button.

Note: *When you are hot-plugging an entire array, run rescan only after all array members (hard disks) have been physically plugged or unplugged from the system. You can rescan all the devices at once using the Rescan function on the Array Management page.*

5 Configuring Spare Disks

To configure spare disks attached to the RocketRAID card, select the "Manage - Spare" function. The Spare Pool Management page will be displayed.



Adding a Spare Disk

To add a spare disk, select a disk from the Available Disks list and click the Add Spare button. This will add the disk to the Spare Pool list.

Removing a Spare Disk

To remove a spare disk, select it from the Spare Pool list and click the Remove Spare button. This will remove the disk from the Spare Pool list.

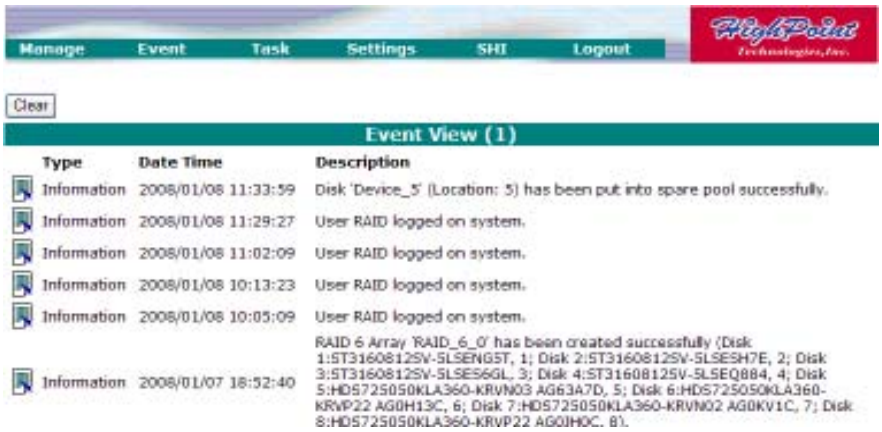
6 Managing Events and Tasks

The HighPoint Web RAID Management Software automatically logs all controller related events that have occurred (for all controllers/cards managed by the software). In addition you can configure E-mail Notification to receive information about these events (see Section 7 Settings -View Events).

Events

Tasks executed by the Management Software, or any disk/array errors reported by the card while the OS is active are known as “Events”. These events are logged (recorded) by the Management Software.

To view logged events, Please select “Event” from the menu. The Event Management page will be displayed.

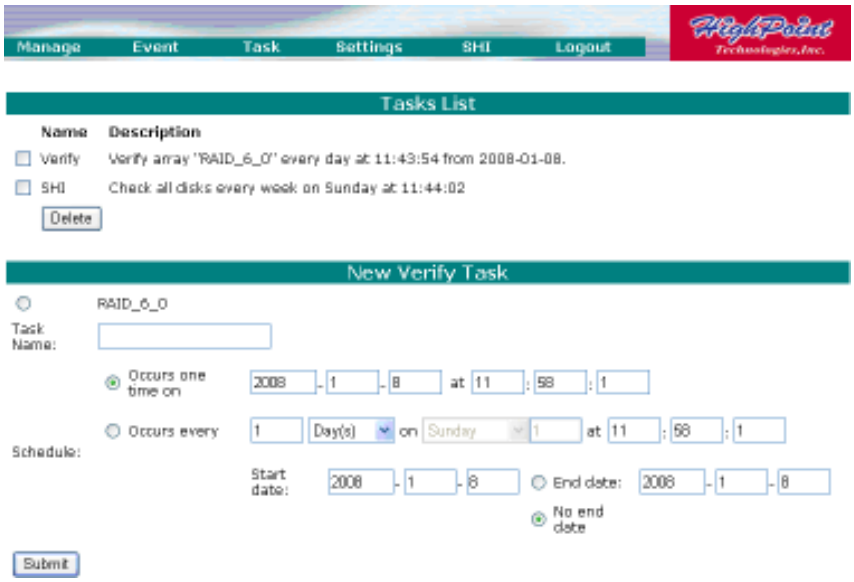

Manage
Event
Task
Settings
SHI
Logout
Clear
Event View (1)
Type
Date Time
Description
Information 2008/01/08 11:33:59 Disk 'Device_5' (Location: 5) has been put into spare pool successfully.
Information 2008/01/08 11:29:27 User RAID logged on system.
Information 2008/01/08 11:02:09 User RAID logged on system.
Information 2008/01/08 10:13:23 User RAID logged on system.
Information 2008/01/08 10:05:09 User RAID logged on system.
Information 2008/01/07 18:52:40 RAID 6 Array 'RAID_6_0' has been created successfully (Disk 1:ST3160812SV-5LSENGST, 1; Disk 2:ST3160812SV-5LSESH7E, 2; Disk 3:ST3160812SV-5LSES6GL, 3; Disk 4:ST3160812SV-5LSEQ884, 4; Disk 5:HDS725050KLA360-KRVN03 AG63A7D, 5; Disk 6:HDS725050KLA360-KRVP22 AG0H13C, 6; Disk 7:HDS725050KLA360-KRVN02 AG0KV1C, 7; Disk 8:HDS725050KLA360-KRVP22 AG0JHOC, 8).

Click the Clear button to clear the event log.

Managing Tasks

With the HighPoint RAID Management Software, you can configure and schedule background rebuild and verify tasks to help maintain the integrity of your drives and data.

You can select menu “Task” to enter Task Management page.



Scheduling a Task

To add a task schedule:

1) Select the array that you want to verify or rebuild.
2) Enter a name for the task.
3) Configure the frequency for the task.
4) Check the Submit button.

Delete a Scheduled Task

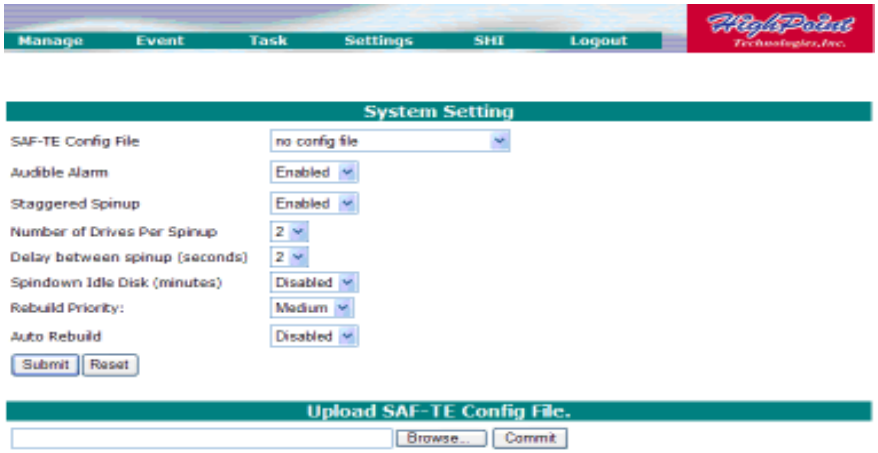
To delete a task schedule:

1) Select a task from the Tasks List.
2) Click the Delete button.

7 Settings

Select the "Settings" option to access Settings page.

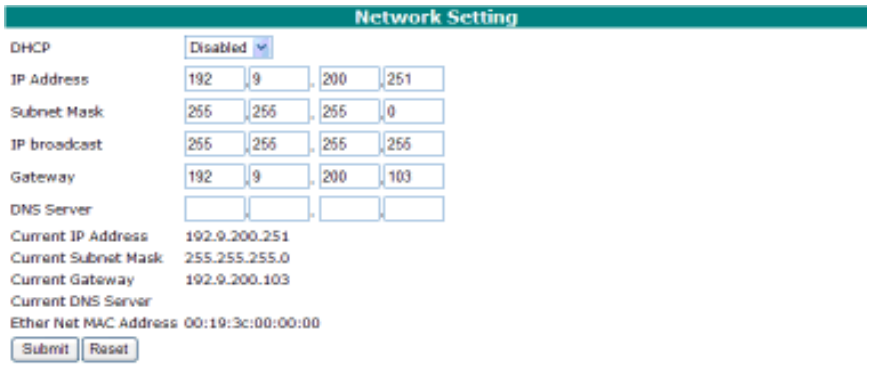
Settings>System



The System Setting page include SAF-TE config file setting, Audible Alarm setting, Staggered Spinup setting, Spindown Idle Disk setting, Rebuild priority setting and Auto Rebuild setting.

The Upload SAF-TE config file option allow user to upload the special SAF-TE config files.

Settings>Network



This page allow user to adjust the onboard LAN values.

Settings>User

This setting allows you to alter the default password (when logging on). Enter a new password and click the "Change Password" button to change the current user's password.

Settings>Email

Enabling E-mail notification:

To configure E-mail notification:

1) Select the "Enable Event Notification" option.
2) Enter the appropriate information for the SMTP server.
3) Click the "Change Setting" button.

Note: *Your SMTP server may require user authentication – enter the appropriate password and username as required.*

To add a Recipient:

1. Enter the necessary information for the desired recipient.
2. Click the Add button.

To test E-mail notification:

1) Enter the necessary information for the recipient.
2) Click the Test button.

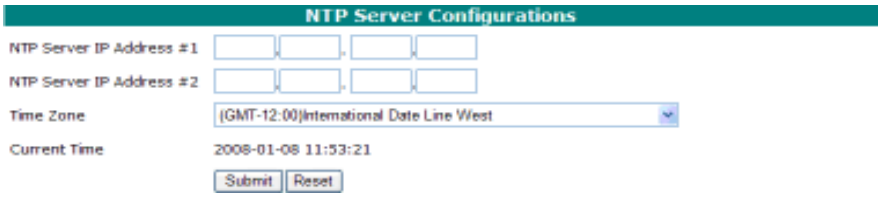
If the software is unable to send a test message, an error will be displayed. Double check the recipient entries and make sure the information is correct.

Settings>SNMP

You can set three SNMP Trap IP address and trap type, this setting will be saved in the flash. While the corresponding type of events generated, the adapter will send SNMP Trap Messages to the designated Trap Receiver through its Ethernet interface.

If you do not use the adapter's Ethernet interface, you can setup the SNMP configuration in the In-Band Management Service configuration page. In this case, the in-band management service will send SNMP Trap messages through the network interface of the host computer.

Settings>NTP



You can check the current firmware time and setup two NTP time server addresses and select the time zone. The adapter will keep its clock synchronized with time sever.

Note: *To use the NTP feature you must setup the Ethernet port of the adapter.*

Chapter 6
Linux Driver Support

Contents of this Chapter:

Fedora Linux installation Overview

SuSE Linux Enterprise Server (SLES) installation Overview

Red Hat Enterprise Linux/CentOS Overview

1 - Overview

The purpose of this document is to provide clear instructions on how to install and use RocketRAID 4320 Controller on Fedora Linux system.

2 - Installing Fedora Linux on RR4320 controller

If you would like to install Fedora Linux onto drives attached to RR4320 controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your hard disks to RR4320 controller, you can use RR4320 BIOS Setting Utility to configure your hard disks as RAID arrays, or just use them as single disks.

Before installation, you must remove all the disk drives, which are not physically attached to RR4320 controller, from your system.

Note: *If you have other SCSI adapters installed, you must make sure the RR4320 controller BIOS will be loaded firstly. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*

Step 2 Check System BIOS Settings

In your system BIOS SETUP menu, change **Boot Sequence** in such a way that the system will first boot from floppy or CDROM, and then from SCSI. Refer to your BIOS manual to see how to set boot sequence.

If your BIOS settings do not support such a boot sequence, you can first set it to boot from floppy or CDROM. After you finish installation, set SCSI as the first boot device to boot up the system.

Step 3 Prepare the Driver Diskette

Driver is contained in a floppy diskette image file, you can get it from our web site for free.

On a DOS or Windows system, you can make the Fedora driver diskette using

rewrite.exe. It can be found on the Fedora Linux CD (under /dosutils). Just run it under a command window and follow its prompt. On a Linux system, you can use the “dd”

command to make the boot diskette. Insert a floppy disk into the floppy drive and type the command(Example): #dd if=rr3xxx_4xxx-fedora.img of=/dev/fd0

Step 4 Install Fedora Linux

Installation steps for Fedora 8

1. Start installing Fedora Linux by booting from the installation DVD.
2. On "**Welcome to Fedora"** installation screen, press "**ESC**", then a prompted label "**boot:**" will appear at the top of the screen. Type in "**linux dd**" (without quotation mark) and then press **Enter**.
3. When prompted "**Do you have a driver disk?"** Select "**Yes**". When prompted "**Insert your driver disk and press OK to continue**", insert the driver diskette in the floppy drive and then select "**OK**". The system will load RR4320 driver automatically. When prompted "**Do you wish to load any more driver disks?"** Select "**No**".
4. Continue the installation as usual. You can refer to Fedora Linux installation guide. Make sure you have finished the next step before system reboot.
5. When installation finishes and prompts you to reboot the system, press "**CTRL+ALT+F2**" to the shell and type the following commands:

```
# chroot /mnt/sysimage
# mount /dev/fd0 /mnt
# sh /mnt/fedora-install-step2.sh
# umount /dev/fd0
# exit
```

Then switch back to console 1 and finish the installation.

Installation steps for Fedora 7

6. Start installing Fedora Linux by booting from the installation DVD.
7. On "**Welcome to Fedora"** installation screen, press "**ESC**", then a prompted label "**boot:**" will appear at the top of the screen. Type in "**linux dd updates**" (without quotation mark) and then press **Enter**.
8. When prompted "**Do you have a driver disk?"** Select "**Yes**". When prompted "**Insert your driver disk and press OK to continue**", insert the driver diskette in

the floppy drive and then select "**OK**". The system will load RR4320 driver automatically. When prompted "**Do you wish to load any more driver disks?"** Select "**No**".

9. When prompted for an update disk source, select **fd0**. The installer will read updates from the driver floppy.

10. Continue the installation as usual. **Do not remove the floppy diskette** until installation completed.

Installation steps for Fedora Core5 & Core6

1. Start installing Fedora Linux by booting from the installation CD.

2. On "Welcome to Fedora Linux" installation screen, a prompted label "boot:" will appear at the bottom of the screen. Type in "linux dd updates" (without quotation mark) and then press Enter.

3. When prompted "Do you have a driver disk?". Select "Yes". When prompted "Insert your driver disk and press OK to continue", insert the driver diskette in the floppy drive and then select "OK". The system will load RR4320 driver automatically.

4. When prompted for an update disk source, select fd0. The installer will read updates from the driver floppy.

5. Continue the installation as usual. Do not remove the floppy diskette until installation completed.

Then switch back to console 1 and finish the installation.

3 - Installing RR4320 driver on an Existing System

Note: *If you use a SCSI adapter to boot your system, you must make sure the RR4320 controller BIOS will be loaded after that adapter's BIOS. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*

Remove hptiop.ko module on Fedora 6 & 7 & 8

If you installed RR4320 controller, you must remove built-in module from system:

 # rm –f /lib/modules/'uname –r'/kernel/drivers/scsi/hptiop.ko
 # rmmod hptiop.ko

Step 1 Obtain the Driver Module

You can extract the module file from the file modules.cgz on the driver disk. Using the following commands:

 # mount /dev/fd0
 # cd /tmp
 # gzip –dc /mnt/floppy/modules.cgz | cpio –idumv

Driver modules for all supported kernel versions will be extracted. You can find the driver module for your running kernel under the directory that matches your kernel version.

Step 2 Test the Driver Module

You can test out the module to ensure that it works for your system by changing working directory to the location where hptiop.o resides and typing in the command "**insmod hptiop.o**". If you are using a distribution with 2.6 kernel it should be "**insmod hptiop.ko**".

Sometimes insmod will report "**unresolved symbols**" when you attempt to load the module. This can be caused by two ways:

1. You haven't loaded the SCSI module before loading hptiop.o. Try to load SCSI modules first.

   E.g. # **modprobe scsi_mod**
   # **modprobe sd_mod**
   # **insmod ./hptiop.o**

2. You are using a kernel that is build off a different configuration with the driver. In this case the precompiled drivers cannot be used. You can build a driver for your kernel using Open Source package for RocketRAID 4320 controller.

To ensure the module has been loaded successfully, you can check the driver status by typing in the command "**cat /proc/scsi/hptiop/x**", where **x** is the filename you found under /proc/scsi/hptiop/. You should see the driver banner and a list of attached drives. You can now access the drives as a SCSI device (the first device is / dev/sda, then /dev/sdb, etc.).

Example: You have configured a RAID 0 array using 2 disks. It will be registered to system as device **/dev/sda**. You can use "**fdisk /dev/sda**" to create a partition on it, which will be **/dev/sda1**, and use "**mkfs /dev/sda1**" to setup a file system on the partition. Then you can mount **/dev/sda1** to somewhere to access it.

Step 3 Configure System to Automatically Load the Driver

Most likely, you will not want to type in "**insmod hptiop.o**" each time you boot up the system. Therefore you must install the module and tell the system about it. To install the module, type in the following commands (first change directory to where the proper hptiop.ko locates):

 # cp hptiop.ko /lib/modules/'uname –r'/kernel/drivers/scsi.
#depmod

Then you should inform the system load the module when system boots up with the following command:

 # echo "modprobe hptiop" > /etc/init.d/hptdriver
 # chmod 755 /etc/init.d/hptdriver
 # ln –sf /etc/init.d/hptdriver /etc/rc.d/rc3.d/S01hptdriver
 # ln –sf /etc/init.d/hptdriver /etc/rc.d/rc4.d/S01hptdriver
 # ln –sf /etc/init.d/hptdriver /etc/rc.d/rc5.d/S01hptdriver

Step 4 Configure System to Mount Volumes when Startup

Now you can inform the system to automatically mount the array by modifying the file /etc/fstab. E.g. you can add the following line to tell the system to mount /dev/sda1 to location /mnt/raid after startup:

/dev/sda1 /mnt/raid ext3 defaults 0 0

4 - Monitoring the Driver

Once the driver is running, you can monitor it through the Linux proc file system support. There is a special file under /proc/scsi/hptiop/.

Note: *The file name is the SCSI host number allocated by OS. If you have no other SCSI cards installed, it will be 0. In the following sections, we will use x to represent this number.*

Checking Devices Status

Using the following command to show driver status:

cat /proc/scsi/hptiop/x

This command will show the driver version number, physical device list and logical device list.

5 - Updating the Driver

1. If the original driver is installed in the system initrd file (e.g. when OS is installed to RR4320 controller), you can update the driver as below:

   # cp hptiop.ko /lib/modules/‘uname –r‘/updates/

   # mkinitrd ‘uname –r‘

   For FC2, the commands should be

   # cp hptiop.ko /lib/modules/‘uname –r‘/kernel/drivers/scsi/

   # mkinitrd —preload scsi_mod —preload sd_mod —with=hptiop /boot/ initrd-‘uname –r‘.img ‘uname –r‘

   It’s recommended to backup the original initrd file before you update the driver.

2. If the original driver is installed in the /lib/modules/‘uname –r‘/kernel/drivers/scsi/ directory, and load it by the script file (e.g. /etc/init.d/hptdriver) during the init process, please replace it with the new driver (hptiop.o or hptiop.ko)

6 - Installing RAID Management Software

HighPoint RAID Management Software is used to configure and keep track of your hard disks and RAID arrays attached to RR4320 controller. Installation of the management software is optional but recommended.

Please refer to HighPoint RAID Management Software documents about more information.

7 - Uninstalling

You can only uninstall the driver when your system is not booting from devices attached to RR4320 controller. Just remove the lines you added to /etc/fstab, and remove the file files you created in the /etc/init.d.

1 - Overview

The purpose of this document is to provide clear instructions on how to install and use Rocket RAID 4320 Controller on SLES Linux system.

2 - Installing SLES Linux on RR4320 Controller

If you would like to install SLES Linux onto drives attached to RR4320 controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your hard disks to RR4320 controller, you can use RR4320 BIOS Setting Utility to configure your hard disks as RAID arrays, or just use them as single disks.

Before installation, you must remove all the disk drives, which are not physically attached to RR4320 controller, from your system.

Note: *If you have other SCSI adapters installed, you must make sure the RR4320 controller BIOS will be loaded firstly. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*

Step 2 Check System BIOS Settings

In your system BIOS SETUP menu, change Boot Sequence in such a way that the system will first boot from floppy or CDROM, and then from SCSI. Refer to your BIOS manual to see how to set boot sequence.

If your BIOS settings do not support such a boot sequence, you can first set it to boot from floppy or CDROM. After you finish installation, set SCSI as the first boot device to boot up the system.

Step 3 Prepare the Driver Diskette

The driver diskette is provided as an image file (slesdd.img).

On a DOS or Windows system, you can make the driver diskette using rawrite.exe. It

can be found on the SLES Linux CD (under /dosutils). Just run it under a command window and follow its prompt.

On a Linux system, you can use the "dd" command to make the driver diskette. Insert a floppy disk into the floppy drive and type the command:

 # dd if=rr3xxx_4xxx-sles.img of=/dev/fd0

Step 4 Install SLES Linux

1. Start installing by booting from SLES installation CD.
2. When CD boots, select "Installation" option and press F6 to load the driver.
3. Insert the Driver Disk when it displays "Please insert the Driver Update floppy".
4. When Diver Update Menu pop-up, press "OK" and "back" for back to installer.
5. Continue the installation as normal. You can refer to SLES Linux documents about OS installation.

Additional Installation Notes

The system device mapping order is the same as the order shown in RR4320 BIOS Setting Utility. If you have no other SCSI adapters installed, the device marked as "BOOT" or "HDD0" will be /dev/sda, "HDD1" will be /dev/sdb, "HDD2" will be /dev/sdc, etc. When creating mount points, you must mount /boot on /dev/sda.

3 - Installing RR4320 Driver on an Existing System

If you are currently running Linux and would like to access drives or arrays attached to the Rocket RAID 4320 controller, you can perform the following steps.

Note:*If you use a SCSI adapter to boot your system, you must make sure the RR4320 controller BIOS will be loaded after that adapter's BIOS. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*

Step 1 Update Grub

If you are running **SLES SMP System**, you must update /boot/grub/menu.lst first.

E.g.

default=0

timeout=8

title Linux

kernel (hd0,1)/vmlinux root=/dev/hda1 **acpi=off**

initrd (hd0,1)/initrd

Then reboot the system to make new kernel parameter take effect.

Step 2 Install the Driver Module

The driver modules are packed in file **/linux/suse /[*arch*]-[*version*]/install/update.tar.gz** on the driver diskette. The following example shows how to extract the driver modules for SLES 9 from driver diskette:

 # mount /dev/fd0 /media/floppy

 # cd /

 # tar xfz /media/floppy/linux/suse/i386-sles9/install/update.tar.gz

The driver modules will be extracted to directory /lib/modules/[*kernel-ver*]/kernel/drivers/scsi/

Step 3 Test the Driver Module

You can test out the module to ensure that it works for your system by typing in the command "**insmod hptiop.ko**".

Sometimes insmod will report "**unresolved symbols**" when you attempt to load the module. This can be caused by two ways:

1. The SCSI module is not loaded in kernel. Try to load SCSI modules first.

E.g.

 # modprobe sd_mod

 # insmod hptiop.ko

Example: You have configured a RAID 1/0 array using 4 disks. It will be registered to system as device **/dev/sda**. You can use "**fdisk /dev/sda**" to create a partition on it, which will be **/dev/sda1**, and use "**mkfs /dev/sda1**" to setup a file system on the partition. Then you can mount **/dev/sda1** to somewhere to access it.

Step 4 Configure System to Automatically Load the Driver

Most likely, you will not want to type in "**insmod hptiop**" each time you boot up the system. You can add the driver to the initial RAM disk image to load the driver at boot time:

1. Edit file /etc/sysconfig/kernel and add hptiop module to the line INITRD_MODULES=..., e.g:

   INITRD_MODULES="reiserfs hptiop"

2. Run depmod to update module configuration:

   # depmod

3. Run mkinitrd to update the initrd file:

   # mkinitrd

4. If you are using lilo boot loader, run lilo again:

   # lilo

Step 5 Configure System to Mount Volumes when Startup

Now you can inform the system to automatically mount the array by modifying the file /etc/fstab. E.g. You can add the following line to tell the system to mount /dev/sda1 to location /mnt/raid after startup:

/dev/sda1 /mnt/raid ext2 defaults 0 0

4 - Updating the Driver

To update the driver, simply reinstall the driver following the steps in previous section, " **Install RR4320 Driver on an Existing System** ".

If the driver is loaded in initrd (e.g. when system is installed on the controller), you need to run mkinitrd to update the initrd file. Also, if you are using lilo boot loader, you need to run lilo again.

5 - Installing RAID Management Software

HighPoint RAID Management Software is used to configure and keep track of your hard disks and RAID arrays attached to RR4320 controller. Installation of the management software is optional but recommended.

Please refer to HighPoint RAID Management Software documents about more information.

6 - Uninstalling

You can only uninstall the driver when your system is not booting from devices attached to RR4320 controller. Just remove the lines you added to /etc/modules.conf and /etc/fstab.

1 - Overview

The purpose of this document is to provide clear instructions on how to install and use RocketRAID 4320 Controller on Red Hat Enterprise Linux/CentOS system. Please refer to HighPoint RAID Management Software documents about more information.

2 - Installing Red Hat Enterprise Linux/CentOS on RR4320 controller

If you would like to install Red Hat Enterprise Linux/CentOS onto drives attached to RR4320 controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your hard disks to RR4320 controller, you can use RR4320 BIOS Setting Utility to configure your hard disks as RAID arrays, or just use them as single disks.

Before installation, you must remove all the disk drives, which are not physically attached to RR4320 controller, from your system.

Note: *If you have other SCSI adapters installed, you must make sure the RR4320 controller BIOS will be loaded firstly. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*

Step 2 Check System BIOS Settings

In your system BIOS SETUP menu, change Boot Sequence in such a way that the system will first boot from floppy or CDROM, and then from SCSI. Refer to your BIOS manual to see how to set boot sequence.

If your BIOS settings do not support such a boot sequence, you can first set it to boot from floppy or CDROM. After you finish installation, set SCSI as the first boot device to boot up the system.

Step 3 Prepare the Driver Diskette

Driver is provided in floppy diskette image file format.

On a DOS or Windows system, you can make the Red Hat driver diskette using rawrite.exe. It can be found on the Red Hat Enterprise Linux/CentOS CD (under /

dosutils). Just run it under a command window and follow its prompt.

On a Linux system, you can use the "dd" command to make the boot diskette. Insert a floppy disk into the floppy drive and type the command (amd64 driver for example):

 # dd if=rr3xxx_4xxx-rhel_centos-.img of=/dev/fd0

Step 4 Install Red Hat Enterprise Linux/CentOS

1. Start installing Red Hat Enterprise Linux/CentOS by booting from the installation CD.
2. On "**Welcome to Red Hat Enterprise Linux/CentOS**" installation screen, a prompted label "**boot:**" will appear at the bottom of the screen: For RedHat Enterprise Linux 3, type in "**expert text**" (without quotation mark);

   For RedHat Enterprise Linux 4 and its update version, type in "**linux dd**" (without quotation mark),

   For RedHat Enterprise Linux 5, type in "**linux dd updates**" (without quotation mark), then press **Enter. Do not remove the floppy diskette** until installation completed.
3. When prompted "**Do you have a driver disk?**". Select "**Yes**".
4. When prompted "**Insert your driver disk and press OK to continue**", insert the driver diskette in the floppy drive and then select "**OK**".
5. The system will load RR4320 driver automatically. Continue the installation as normal.
6. When asked "**where do you want to install the boot loader?** " in the "Boot Loader Configuration" dialog, you must select "**Master Boot Record (MBR)**" to make your system be able to boot RR4320 controller.
7. Continue the installation as normal. You can refer to Red Hat Enterprise Linux/ CentOS installation guide.

Note

1. *The system device mapping order is the same as the order shown in RR4320 BIOS Setting Utility.*

Note:

1. *The system device mapping order is the same as the order shown in RR4320 BIOS Setting Utility.*

2. *On some system the LILO boot loader may be installed incorrectly unless you specify BIOS parameters in /etc/lilo.conf. During installation, when prompted "Would you like to create a boot disk for your system?", switch to console 2 by pressing <Ctl>+<Alt>+F2. Then use the following command:*

 # chroot /mnt/sysimage
 # vi /etc/lilo.conf
Add two lines under the line "boot=/dev/sda":
disk=/dev/sda
bios=0x80
 # /sbin/lilo
Press <Ctl>+<Alt>+F1 to continue the installation

3 - Installing RR4320 driver on an Existing System

Note: *If you use a SCSI adapter to boot your system, you must make sure the RR4320 controller BIOS will be loaded after that adapter's BIOS. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*

Step 1 Obtain the Driver Module

You can extract the module file from the file modules.cgz on the driver disk. Using the following commands:

 # mount /dev/fd0
 # cd /tmp
 # gzip -dc /mnt/floppy/modules.cgz | cpio -idumv

Driver modules for all supported kernel versions will be extracted. You can find the driver module for your running kernel under the directory that matches your kernel version (/tmp/'uname –r'/hptiop.ko).

Step 2 Test the Driver Module

You can test out the module to ensure that it works for your system by changing working directory to the location where hptiop.o resides and typing in the command "**insmod hptiop.ko**". If you are using a distribution with 2.4 kernel, driver file should be **hptiop.o**.

Sometimes insmod will report "**unresolved symbols**" when you attempt to load the module. This can be caused by two ways:

1. You haven't loaded the SCSI module before loading hptiop.o. Try to load SCSI modules first.

   E.g. # **modprobe sd_mod**
   # **insmod hptiop.ko**

2. You are using a kernel that is build off a different configuration with the driver. In this case the precompiled drivers cannot be used. You can build a driver for your kernel using OpenBuild package for RocketRAID 4320 controller.

   To ensure the module has been loaded successfully, you can check the driver status by typing in the command "**cat /proc/scsi/hptiop/x**", where **x** is the filename you found under /proc/scsi/hptiop/. You should see the driver banner and a list of attached drives. You can now access the drives as a SCSI device (the first device is /dev/sda, then /dev/sdb, etc.).

Example: You have configured a RAID 0 array using 2 disks. It will be registered to system as device **/dev/sda**. You can use "**fdisk /dev/sda**" to create a partition on it, which will be **/dev/sda1**, and use "**mkfs /dev/sda1**" to setup a file system on the partition. Then you can mount **/dev/sda1** to somewhere to access it.

Step 3 Configure System to Automatically Load the Driver

Most likely, you will not want to type in "**insmod hptiop.ko**" each time you boot up the system. Therefore you must install the module and tell the system about it. To install the module, type in the following commands (first change directory to where the proper hptiop.ko locates):

#cp -rf hptiop.ko /lib/modules/'uname –r'/kernel/drivers/scsi/
#depmod

Then you should inform the system load the module when system boots up with the following command:

#echo "modprobe hptiop" > /etc/init.d/hptdriver

#chmod 755 /etc/init.d/hptdriver

#ln –sf /etc/init.d/hptdriver /etc/rc.d/rc3.d/S01hptdriver

#ln –sf /etc/init.d/hptdriver /etc/rc.d/rc4.d/S01hptdriver

#ln –sf /etc/init.d/hptdriver /etc/rc.d/rc5.d/S01hptdriver

Step 4 Configure System to Mount Volumes when Startup

Now you can inform the system to automatically mount the array by modifying the file /etc/fstab. E.g. you can add the following line to tell the system to mount /dev/sda1 to location /mnt/raid after startup:

/dev/sda1 /mnt/raid ext3 defaults 0 0

4 - Monitoring the Driver

Once the driver is running, you can monitor it through the Linux proc file system support. There is a special file under /proc/scsi/hptiop/. Through this file you can view driver status and send control commands to the driver.

Note: *The file name is the SCSI host number allocated by OS. If you have no other SCSI cards installed, it will be 0. In the following sections, we will use x to represent this number.*

Checking Devices Status

Using the following command to show driver status:

cat /proc/scsi/hptiop/x

This command will show the driver version number, physical device list and logical device list.

5 - Updating the Driver

First obtain the new driver module file hptiop.o from the driver image. Refer to the previous section "**Obtain the Driver Module**". In the following steps, we assume you have copied it to /tmp/**hptiop.ko**, and your initrd file is **/boot/initrd-`uname –r`.img**

1. If you are not booting from disks attached to RR4320 controller, you can update the driver just by reinstalling it following the previous section, "**Install**

RR4320 driver on an Existing System". Overwrite the driver file in the directory "**/lib/modules/`uname –r`/kernel/drivers/scsi/". #cp –f /tmp/hptiop.ko /lib/modules/`uname –r`/kernel/drivers/scsi/**

2. If you are using a system installed to RR4320 controller, you can update the driver file in the directory "**/lib/modules/`uname –r`/updates/",** then update the initrd file.

   #cp –f /tmp/hptiop.ko /lib/modules/'uname –r'/updates/

   #mkinitrd initrd-'uname –r'.img 'uname –r'

If you are using lilo to boot your system, use "**lilo**" to reinstall the RAM disk:

lilo

6 - Installing RAID Management Software

HighPoint RAID Management Software is used to configure and keep track of your hard disks and RAID arrays attached to RR4320 controller. Installation of the management software is optional but recommended.

Please refer to HighPoint RAID Management Software documents about more information.

7 - Uninstalling

You can only uninstall the driver when your system is not booting from devices attached to RR4320 controller. Just remove the lines you added to /etc/fstab, and remove the file files you created in the /etc/init.d.

Chapter 7
FreeBSD Driver Support

Contents of this Chapter:

1 - Overview
2 - Installing FreeBSD on the RocketRAID 4320 Controller
3 - Installing the RocketRAID 4320 Driver on an Existing System
4 - Updating the Driver
5 - Installing RAID Management Software
6 - Uninstalling the Driver

1 - Overview

The purpose of this document is to provide clear instructions on how to install and use RocketRAID 4320 Controller on a FreeBSD system.

2 - Installing FreeBSD on RocketRAID 4320 Controller

If you would like to install FreeBSD onto drives attached to RocketRAID 4320 controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your hard disks to RR4320 controller, you can use RR4320 BIOS Setting Utility to configure your hard disks as RAID arrays, or just use them as single disks.

Note: *If you have other SCSI adapters installed, you must make sure the RR4320 controller BIOS will be loaded firstly. If not, try to move it to another PCI slot.*

Otherwise you may be unable to boot up your system.

Step 2 Check System BIOS Settings

In your system BIOS SETUP menu, change **Boot Sequence** in such a way that the system will first boot from CDROM, next from and then from floppy drive, and then from SCSI. Refer to your BIOS manual to see how to set boot sequence.

If your BIOS settings do not support such a boot sequence, you can first set it to boot from CDROM. After you finish installation, set SCSI as the first boot device to boot up the system.

Step 3 Prepare the Driver Diskette

If you are installing FreeBSD, you must prepare a driver disk for RR4320 before installation.

First obtain the driver diskette image file, freebsd.img.

On a DOS or Windows system, you can make the boot diskette using rawrite.exe. It can be found on the FreeBSD CD (under \tools). Just run it under a command window and follow its prompt.

On a FreeBSD system, you can use the "dd" command to make the driver diskette. For example, Insert a floppy disk into the floppy drive and type the following command if you are installing FreeBSD versions:

 # dd if=rr3xxx_4xxx-bsd.img of=/dev/fd0

Step 4 Install FreeBSD

1. Start installing the FreeBSD by booting from installation CD.
2. If you are installing FreeBSD 5.0 or earlier versions:

   When "**Hit [enter] to boot immediately or any other key for command prompt**" screen appears, press SPACE key to stop loader from autobooting.

```
BTX loader 1.00 BTX version is 1.01
        Console: internal video/keyboard
        BIOS driver A: is disk0
        BIOS driver B: is disk1
        BIOS driver C: is disk2
        BIOS 636kB/74512kB available memory
        FreeBSD/i386 bootstrap loader, Revision 0.8
        (mailto:jkh@narf.osd.bsdi.com, Sat Apr 21 08:46:19
    GMT 2001)
        -
        Hit [Enter] to boot immediately, or any other key for
    command prompt.
        Booting [kernel] in 9 seconds¡-
        <-press SPACE key
```

   For 5.1 or later version:

   when "**Welcome to FreeBSD**" screen appears, select "**6**".

3. A prompted label "ok" will appear at the botton of the screen.
4. Insert RR3xxx/4xxx driver diskette into floppy drive now. Type in "**load diskx: hptiop-x.x**" (without quotation mark) and then press **enter**.

```
for FreeBSD 4.3-RELEASE
ok load kernel
ok load disk1:hptiop-4.3.ko

for FreeBSD 4.4-RELEASE
  ok load kernel
```

```
  ok load disk1:hptiop-4.4.ko

for FreeBSD 4.5-RELEASE
  ok load disk1:hptiop-4.5.ko

for FreeBSD 4.6.2-RELEASE
  ok load disk1:hptiop-4.6.2.ko

for FreeBSD 4.7-RELEASE
  ok load disk1:hptiop-4.7.ko

for FreeBSD 4.8-RELEASE
  ok load disk1:hptiop-4.8.ko

for FreeBSD 4.9-RELEASE
  ok load disk1:hptiop-4.9.ko

for FreeBSD 4.10-RELEASE
  ok load disk1:hptiop-4.10.ko

for FreeBSD 4.11-RELEASE
  ok load disk1:hptiop-4.11.ko

for FreeBSD 5.0-RELEASE
  ok load disk0:hptiop-5.0.ko

for FreeBSD 5.1-RELEASE
  ok load disk0:hptiop-5.1.ko

for FreeBSD 5.2.1-RELEASE
  ok load disk0:hptiop-5.2.1.ko


for FreeBSD 5.3-RELEASE
  ok load disk0:hptiop-5.3.ko

for FreeBSD 5.3-AMD64-RELEASE
  ok load disk0:hptiop-5.3-amd64.ko
```

```
  for FreeBSD 5.4-RELEASE
    ok load disk0:hptiop-5.4.ko

  for FreeBSD 5.4-AMD64-RELEASE
    ok load disk0:hptiop-5.4-amd64.ko

  for FreeBSD 5.5-RELEASE
    ok load disk0:hptiop-5.5.ko

  for FreeBSD 5.5-AMD64-RELEASE
    ok load disk0:hptiop-5.5-amd64.ko

  for FreeBSD 6.0-RELEASE
    ok load disk0:hptiop-6.0.ko

  for FreeBSD 6.0-AMD64-RELEASE
    ok load disk0:hptiop-6.0-amd64.ko

  for FreeBSD 6.1-RELEASE
    ok load disk0:hptiop-6.1.ko

  for FreeBSD 6.1-AMD64-RELEASE
    ok load disk0:hptiop-6.1-amd64.ko

  for FreeBSD 6.2-RELEASE
    ok load disk0:hptiop-6.2.ko

for FreeBSD 6.2-AMD64-RELEASE
    ok load disk0:hptiop-6.2-amd64.ko


for FreeBSD 6.3-RELEASE
    ok load disk0:hptiop-6.3.ko


for FreeBSD 6.3-AMD64-RELEASE
    ok load disk0:hptiop-6.3-amd64.ko
```

```
for FreeBSD 7.0-RELEASE
    ok load hptiop.ko


for FreeBSD 7.0-AMD64-RELEASE
    ok load hptiop.ko
```

5. After the driver has been loaded, remove the floppy diskette from the floppy drive.

6. Type in “boot” and continue the installation as normal. You can refer to FreeBSD installation guide.

```
ok boot
```

Note: *On some systems with ACPI enabled, FreeBSD may not work. You can try to disable ACPI in system BIOS or type the command “**set hint.acpi.0.disabled=”1”**” under boot prompt to solve the problem.*

FreeBSD 7.0 and later version natively support RR3xxx/4xxx, but you still need to load the driver manually.

For FreeBSD 4.x/5.x/6.x version: On the driver disk, there is a setup script “postinstall” which will do this work for you. Before you reboot the system, press Alt-F4 to the command shell and type the following commands:

```
# mount -o ro /dev/fd0 /mnt
# sh /mnt/postinstall
# umount /mnt
```

For FreeBSD 7.x version: press Alt-F4 to the command shell and type the following commands:

```
# echo 'hptiop_load="YES"' >>/boot/defaults/loader.conf
```

Then press Alt-F1 to return to the setup screen and choose [X Exit Install] to finish setup.

3 - Installing RR3xxx/4xxx Driver on an Existing System

If you are currently running FreeBSD and would like to access drives or arrays attached to the RR3xxx/4xxx Controller, you can perform the following steps.

Step 1 Copy the Driver Module

If you have made freebsd drivers into a diskette, you can insert the driver diskette to floppy drive, then using the following commands to copy the driver module:

```
for FreeBSD 4.x:
  # mount -o ro /dev/fd0 /mnt
  # cp /mnt/hptiop-xxx.ko /modules/hptiop.ko
  # umount /mnt
for FreeBSD 5.x and 6.x:
  # mount -o ro /dev/fd0 /mnt
  # cp /mnt/hptiop-xxx.ko /boot/kernel/hptiop.ko
  # umount /mnt
```

You can also extract the files from .img files directly, without using a floppy diskette:

```
For FreeBSD 4.x:
# vnconfig vn0c rr3xxx/4xxx-bsd-xxx.img
# mount /dev/vn0c /mnt
# cp /mnt/hptiop-xxx.ko /modules/hptiop.ko
# vnconfig -du vn0c myfilesystem mount=/mnt
For FreeBSD 5.x and 6.x:
# mdconfig -a -t vnode -f rr3xxx/4xxx-bsd-xxx.img -u 0
# mount /dev/md0 /mnt
# cp /mnt/hptiop-xxx.ko /boot/kernel/hptiop.ko
# umount /mnt
# mdconfig -d -u md0
```

FreeBSD 7.x version natively supports RR3xxx/4xxx, and its built-in driver module hptiop.ko is located at /boot/kernel/hptiop.ko.

Step 2 Test the Driver Module

You can test out the module to ensure that it works for your system by load it during system booting.

If the module has been loaded successfully you should see the RR4320 banner and a display screen of the attached drives. You can now access the drives as a SCSI device

(if you have no other SCSI device, the first device is /dev/da0, then /dev/da1, etc.).

Example

1. Load it at boot loader for 5.0 or earlier version:

```
F1 FreeBSD
Default: F1
>> FreeBSD/i386 BOOT
Default: 0:ad(0,a)/boot/loader
boot:
BTX loader 1.00 BTX version is 1.01
Console: internal video/keyboard
BIOS driver A: is disk0
BIOS driver C: is disk2
BIOS 636kB/74512kB available memory
FreeBSD/i386 bootstrap loader, Revision 0.8
(mailto:jkh@narf.osd.bsdi.com, Sat Apr 21 08:46:19 GMT
2001)
Loading /boot/defaults/loader.conf
/kernel text=0x24f1db data=0x3007ec+0x2062c -
<- For FreeBSD 5.1 and later: select "6" on "Welcome to
FreeBSD" screen.
Hit [Enter] to boot immediately, or any other key for
command prompt.
Booting [kernel] in 9 seconds¡-
<-press SPACE key
Type '?' for a list of commands, 'help' for more de-
tailed help.
ok load hptiop
/modules/hptiop.ko text=0xf571 data=0x2c8+0x254
ok autoboot
```

2. Load it at boot loader for 5.1 or later version:

when "**Welcome to FreeBSD**" screen appears, select "**6**", an "ok" prompt will appear.

```
ok load hptiop
```

3. Load it when system is running:

```
#kldload hptiop
```

If you have configured a RAID 5 using 8 disks, it will be registered to system as device **/dev/da0**. You can use "**/stand/sysinstall**" to create partitions and disklabels *(like da0s1e)* on **da0**. Then you can create new filesystem using "**newfs /dev/da0s1e**".

Now you can mount **/dev/da0s1e** to somewhere to access it.

Step 3 Configure System to Automatically Load the Driver

Most likely, you will not want to type “load hptiop” each time you boot up the system. Therefore you must install the module and tell the system about it. To configure system to automatically load the driver, type in the following commands:

```
# echo 'hptiop_load="YES"' >> /boot/defaults/loader.conf
```

This tells the loader to try loading the RR4320 module together with the kernel.

Now, reboot the system. RR4320 module should be automatically loaded each time system start up.

Note: *If FreeBSD you installed is 4.x version, you should type the following command to configure your system:*

 # mknod /dev/hptiop c 200 0

*Then, please check whether node“**/dev/hptiop**”exists in /dev directory.*

Step 4 Configure System to Mount Volumes when Startup

Now you can inform the system to automatically mount the array by modifying the file /etc/fstab. E.g. You can add the following line to tell the system to mount /dev/da1s1e to location /mnt/hpt after startup:

/dev/da1s1e /mnt/hpt ufs rw 0 0

4 - Updating the Driver

To update the driver with a new version you simply reinstall the driver following the previous section, “Install the driver on an existing system”.

5 - Installing RAID Management Software

HighPoint RAID Management Software is used to configure and keep track of your hard disks and RAID arrays attached to RR4320 controller. Installation of the management software is optional but recommended.

Please refer to HighPoint RAID Management Software documents about more information.

6 - Uninstalling

You can only uninstall the driver when your system is not booting from devices attached to RR4320 controller. Just remove the line

hptiop_load=”YES”

in /boot/defaults/loader.conf, and then delete the driver **module /modules/hptiop.ko** or **/boot/kernel/hptiop.ko.**

Chapter 8

Mac OSX Driver

Contents of this Chapter:

Installing the driver and RAID utility

1 Installing the driver and RAID utility

Installing the package

1. Double click the package labeled "**rr3xxx-mac-v120-113007.dmg**" to start the installation process *("xxx" refers to the revision of the driver)*. This will open the driver and software package.
2. Double click the **"RR3xxx_4xxx-mac-v122-080421.dmg"** file to start the installer.
3. When the Installer window opens, click the "**Continue**" button.
4. The installer will ask you to select a destination for the driver. Make sure to select the boot Volume - the driver must be installed to /System/Library/Extensions/ folder in order to function properly.
5. Click the "Install" button.

   You will be prompted: "clicking the install button will install a basic installation of the software package on your selected volume". Confirm the prompt to install the software package.
6. You will then be notified that a reboot is needed to install the software. Click "Continue Installation**".**
7. The driver will then be installed into the system. Click "Restart" to restart the ystem.

After the system restarts, you can use a web browser to configure the controller and setup RAID arrays. Use the MacOSX Disk Utility to create partitions the RAID arrays.

Web RAID Management Utility

Please refer to page 5-1 – the Web utility utilizes a universal interface, and operates in the same manner as revisions released for other operating systems.

Appendix
Customer Support

Customer Support

If you encounter any problems while utilizing the RocketRAID 4320, or have any questions about this or any other HighPoint product, feel free to contact our Customer Support Department.

Troubleshooting Checklist

Before contacting our Customer Support department:

Make sure the latest BIOS, driver and RAID Software have been installed for the RocketRAID 4320. Updates are available from our website.

Prepare a list of the computer system's hardware and software (motherboard, CPU, memory, other PCI devices/host adapters, operating system, applications)

Contact Information

E-mail address: support@highpoint-tech.com

Phone: 408-942-5800 (request for support)

9:00AM-6:00PM, Pacific Standard Time

Additional information about HighPoint products is available from our web site:

http://www.highpoint-tech.com

FCC Part 15 Class B Radio Frequency Interference statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

European Union Compliance Statement

This Information Technologies Equipment has been tested and found to comply

with the following European directives:

- European Standard EN55022 (1998) Class B
- European Standard EN55024 (1998)